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ABBREVIATIONS

ARRADCOM	U.S. Army Armament Research and Development Command
ARRCOM	U.S. Armament Materiel Readiness Command
DOD	Department of Defense
GAO	General Accounting Office
PCP	Pentachlorophenol

AUG 2 5 1981

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BY THE U.S. GENERAL ACCOUNTING OFFICE

To The Secretary Of Defense

DOD Can Save Millions By Using Less Expensive Packaging For Small Arms Training Ammunition

COMPLETED OFFICIAL

The Department of Defense is paying more than it needs to for ammunition intended for small arms training. Such ammunition, 5.56-mm. and 7.62-mm., is bought in combat packs and is equipped with items, such as bandoliers and stripper clips, that are often discarded during training exercises. Packaging for small arms training ammunition will cost more than $39 million during fiscal years 1982 through 1986.

GAO estimates that DOD could reduce these costs by $33 million by buying ammunition packaged in less expensive containers and without items not used in training.

PLRD-81-53
AUGUST 18, 1981

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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

PROCUREMENT, LOGISTICS,
AND READINESS DIVISION

B-204239

The Honorable Caspar W. Weinberger
The Secretary of Defense

Dear Mr. Secretary:

This report discusses the Department of Defense's packaging of small arms training ammunition and suggests ways to reduce packaging costs.

We discussed the report with Defense officials and have incorporated their comments where appropriate.

This report contains recommendations to you on page 19. As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the House Committee on Government Operations and the Senate Committee on Governmental Affairs not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this report to the Chairmen, House Committee on Government Operations, Senate Committee on Governmental Affairs, and House and Senate Committees on Appropriations and on Armed Services; the Director, Office of Management and Budget; and the Secretaries of the Army, Navy, and Air Force.

Sincerely yours,

Donald J. Horan

Donald J. Horan
Director

A

GENERAL ACCOUNTING OFFICE
REPORT TO THE SECRETARY
OF DEFENSE

DOD CAN SAVE MILLIONS BY USING LESS EXPENSIVE PACKAGING FOR SMALL ARMS TRAINING AMMUNITION

D I G E S T

On the basis of current prices, the Department of Defense (DOD) will spend more than $39 million during fiscal years 1982 through 1986 on the packaging of 5.56-mm. and 7.62-mm. ammunition used in training. GAO's review, undertaken to determine whether packaging costs could be reduced, found that DOD could save about $33 million by using less expensive fiberboard containers and outer packs and by eliminating items, such as bandoliers, stripper clips, and loader adaptors, not used in training exercises. GAO's review focused on 5.56-mm. ammunition used in the M16 rifle and 7.62-mm. ammunition used in the M14 rifle and in several types of machine guns, primarily the M60. According to mid-1980 acquisition plans, almost all the planned fiscal years 1982-86 procurement of these two items will be used for training.

Generally, 5.56-mm. and 7.62-mm. ammunition is packed in cardboard boxes. The boxes, with minor exceptions, are packed in either M2A1 or M19A1 metal containers. The metal containers are then packed in wirebound wood crates--the M2A1 containers, two to a crate; the M19A1 four to a crate.

The 5.56-mm. ball ammunition and seven of the eleven 7.62-mm. types are packed in cloth bandoliers. Each 10 rounds of the 5.56-mm. ball ammunition is packed in a metal stripper clip. The rounds from these clips are loaded into the weapon magazine with a metal magazine feeder that is packed with each bandolier. Although DOD regulations require that rotational stocks be purchased only with packaging needed to meet repetitive issue demands, small arms training ammunition is purchased in the more expensive combat pack. According to officials of the Army Armament Materiel Readiness Command, DOD's single manager for conventional ammunition, this more expensive packaging is used because

--users want the ammunition they train with in peacetime to be packed like ammunition used for combat and

--the combat pack gives DOD the flexibility to divert training ammunition to combat use. (See p. 9.)

GAO believes that using the more expensive combat pack generally is not warranted in the training environment. For example:

--Although bandoliers are needed in combat, they are not needed and are seldom used in training. They are either discarded as trash or sent to the disposal yard as scrap. None is recycled for use in subsequent ammunition production runs. (See p. 11.)

--Stripper clips and loader adaptors facilitate rapid loading, 10 rounds at a time. While critical for combat, this requirement is questionable for training. For example, Marine Corps and Air Force qualification firings typically involve less than 10 rounds during each firing order. Therefore, rounds must be removed from the clip and loaded into the magazine, one at a time. (See p. 13.)

--Metal containers and wirebound wood crates provide training ammunition with packaging designed to last 10 years in outside storage. While combat stocks may require this level of protection, training ammunition does not. Less expensive fiberboard would adequately protect training ammunition. (See pp. 5 and 13.)

GAO recognizes that users need to be familiar with the configuration of the combat pack and that the military services will have to continue obtaining some training ammunition with this type of packaging. However, GAO does not agree that combat packs are needed for all training ammunition. Users told GAO that frequently they neither need nor use bandoliers, stripper clips, and magazine feeders during training. (See p. 11.) The need to divert training ammunition to combat use clearly does not apply to blank ammunition, which accounts for more than half of DOD's planned procurement of 5.56-mm. and 7.62-mm. ammunition. (See p. 11.) Also, in GAO's opinion, the flexibility to divert live training

ammunition to combat use would not necessarily be lost if DOD used a more economical pack. (See p. 10.)

The wooden crates used to pack ammunition are treated with pentachlorophenol, an environmentally hazardous chemical. Using fiberboard containers rather than wood crates would eliminate the health hazard associated with the chemically treated crates and contribute to the Army's public image by demonstrating the Army's concern for protecting the environment and the public. (See p. 19.)

RECOMMENDATIONS

GAO recommends that the Secretary of Defense (1) instruct the Army to use the available 5.56-mm. training pack and (2) require the other services to requisition the training pack. GAO also recommends that the Secretary require the Army to have other types of training ammunition packaged in fiberboard containers without bandoliers, stripper clips, and magazine feeders.

AGENCY COMMENTS

GAO discussed a draft of this report with DOD officials, and they agreed with the conclusions and recommendations. Their comments have been incorporated into the report where appropriate.

Tear Sheet

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ABBREVIATIONS

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CHAPTER 1

INTRODUCTION

Small arms ammunition includes various sizes, generally ranging up to 1/2-inch in diameter. It is used in automatic pistols, revolvers, rifles, carbines, machine guns, and shotguns.

The Department of Defense (DOD) purchases this ammunition for use in both training and combat. Specifications for packaging can vary depending on the intended use, expected mode of transportation, and anticipated storage conditions.

Two of the more common small arms ammunition sizes are the 5.56-mm.--used in the M16 rifle--and the 7.62-mm.--used in the M14 rifle and in several types of machine guns, primarily the M60. These two sizes are used by all the military services. According to acquisition plans 1/ developed in June and July of 1980, these sizes will account for over $682 million, or about 46 percent of DOD's fiscal years 1982-86 procurement of small arms ammunition.

This planned acquisition includes over 1.6 billion rounds of the 5.56 size and over 815 million rounds of the 7.62 size. About 282 million of this total is ammunition currently under development and therefore not included in our review. Of the more than 2 billion remaining rounds, service officials indicated that all but about 6 million would be needed for training (see app. I).

This review addressed the packaging of 5.56-mm. and 7.62-mm. training ammunition. On the basis of fiscal year 1982 prices, projected packaging costs for this ammunition are expected to exceed $39 million during fiscal years 1982 through 1986.

REQUIREMENTS FOR PACKAGING SMALL ARMS AMMUNITION

Packaging for small arms ammunition is governed by the military services' joint regulation entitled "Packaging of Materiel." This regulation has established three levels of packaging--A, B, and C--to adequately and economically protect material.

> Level A - Maximum protection: Ultimate destination is unknown, duration or condition is unknown, unfavorable transportation or handling conditions are anticipated, open-type storage is anticipated, or the item is known or anticipated to require the maximum degree of protection.

1/We recognize that acquisition plans are continually updated and that the data in these plans are subject to change.

Level B - Intermediate protection: Ocean shipment is involved and the item is intended for immediate use or favorable transportation, storage, and handling conditions are known to exist.

Level C - Minimum protection: Movement, storage, and handling conditions are known to permit this level or the item is to be shipped by other than ocean break-bulk transportation and will be used at the first receiving activity.

The regulation requires the services' item inventory manager to

--protect material at a level not higher than necessary for storage and anticipated redistribution,

--procure rotational 1/ stocks with the level of protection needed to meet repetitive issue demands, and

--ensure that nonrotational depot stocks are preserved and packed at the appropriate level of protection required to support contingency operations.

Title 49 of the Code of Federal Regulations provides further guidance on the packaging of small arms ammunition for transportation. According to the title, small arms ammunition shipments must be packaged (1) in pasteboard or other inside boxes, (2) with partitions designed to fit snugly in an outside container, or (3) in metal clips. The partitions and metal clips must be designed to protect the primers. The inside boxes, partitions, and metal clips must be packed in securely closed, strong outside wooden or fiberboard boxes or metal containers.

On the basis of (1) guidance provided by the joint service packaging regulation, (2) restrictions imposed by title 49, (3) safety considerations, and (4) the users' specified requirements, the U.S. Army Armament Research and Development Command (ARRADCOM) develops packaging for new items of small arms ammunition used by the Army. ARRADCOM can establish more than one packaging arrangement for the same type of ammunition. If it does, each type is assigned a separate national stock number.

The Army Armament Materiel Readiness Command (ARRCOM)--DOD's single manager for conventional ammunition--assumes responsibility for small arms ammunition after ARRADCOM has completed initial development. ARRCOM must approve any changes to established small arms ammunition packaging, but since ARRADCOM has most of the technical expertise in the packaging area, its concurrence is sought on any proposed changes.

1/Stocks required for day-to-day operation, such as training ammunition, as opposed to nonrotational stocks that are set aside to support contingency operations.

The other military services generally use established Army packaging arrangements for small arms ammunition. However, if another service exclusively uses a type of ammunition, it will develop the initial packaging.

OBJECTIVES, SCOPE, AND METHODOLOGY

Preliminary work indicated that (1) DOD generally packaged training ammunition the same way it packaged ammunition intended for use in combat and (2) this practice may be uneconomical. Our objectives were to

--determine whether this level of packaging is necessary for training situations, and if not,

--identify less expensive packaging alternatives.

We did not consider packaging changes for ammunition which is stockpiled for use in combat.

To evaluate DOD's current packaging practice, we obtained and analyzed the rationale for such practices. We reviewed instructions and regulations and held discussions with the military services' item inventory managers and officials at various headquarters and activities responsible for developing the packaging criteria.

To identify less expensive packaging alternatives, we discussed transportation and storage criteria with depot and ammunition manufacturing plant personnel and with personnel at various headquarters. We also visited various units that use 5.56-mm. and 7.62-mm. training ammunition to determine the impact on training if less expensive packages were to be used. We selected users from each service but concentrated on the Army and Marine Corps because they are the predominate users of small arms ammunition. We also reviewed and analyzed two recent studies that identified less expensive packaging alternatives. One of these studies was made by ARRADCOM. The other was a change proposal by the contractor at the Army's Lake City Ammunition Plant.

During the review, which was completed in March 1981, we obtained information from the following:

--Office of the Secretary of Defense--Manpower, Reserve Affairs and Logistics, Washington, D.C.

--Department of Defense Packaging Center, Tobyhanna, Penn.

--U.S. Army Armament Research and Development Command, Dover, N.J.

--Army Defense Ammunition Center and School, Savannah, Ill.

--U.S. Army Materiel Development and Readiness Command, Alexandria, Va.

--U.S. Army Training and Doctrine Command, Fort Monroe, Va.

--Military service item managers--5.56-mm. and 7.62-mm. ammunition, various locations.

--Air Force Manpower and Personnel Center--small arms training section, Randolph Air Force Base, Tex.

--Applied Sciences Department, Naval Weapons Support Center, Crane, Ind.

--Milan Army Ammunition Plant, Tenn.

--Lake City Army Ammunition Plant, Mo.

--U.S. Army Armament Materiel Readiness Command, Ill.

--7th Infantry Division, Fort Ord, Calif.

--1st Marine Division, Camp Pendleton, Calif.

--Recruit Field Training Detachment, Camp Pendleton, Calif.

--Infantry Training School, Camp Pendleton, Calif.

--60th Military Airlift Wing, Travis Air Force Base, Calif.

--Marine Corps Barracks, Mare Island, Calif.

--Defense Property Disposal Office, Camp Pendleton, Calif.

--Defense Property Disposal Office, Fort Ord, Calif.

--Pueblo Army Depot Activity, Col.

--Umatilla Army Depot Activity, Ore.

AGENCY COMMENTS

We discussed a draft of this report with DOD officials, and they agreed with the conclusions and recommendations. We have incorporated their comments into the report where appropriate.

CHAPTER 2

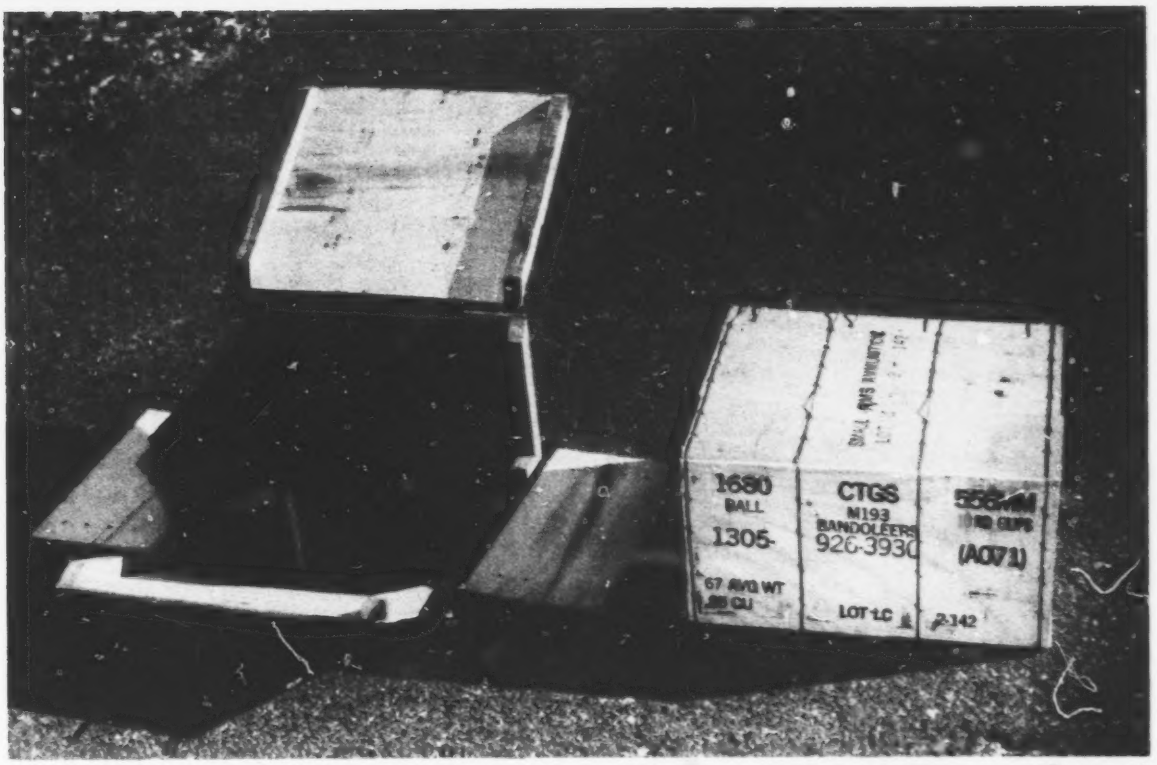
PACKAGING OF 5.56-MM. AND 7.62-MM. AMMUNITION

Most 5.56-mm. and 7.62 mm. ammunition planned for procurement between fiscal years 1982 and 1986 will be needed for training. However, this ammunition will be placed in a level A pack that is designed to last 10 years in outdoor storage. In our opinion, this maximum level of protection is not necessary for training ammunition. In addition, we believe that training ammunition does not need to be packaged with bandoliers and clips that are not used in training.

DOD's current packaging practices, the costs of packaging, and the rationale for using packaging are discussed below. Areas in which we believe DOD can effect savings are discussed in chapter 3.

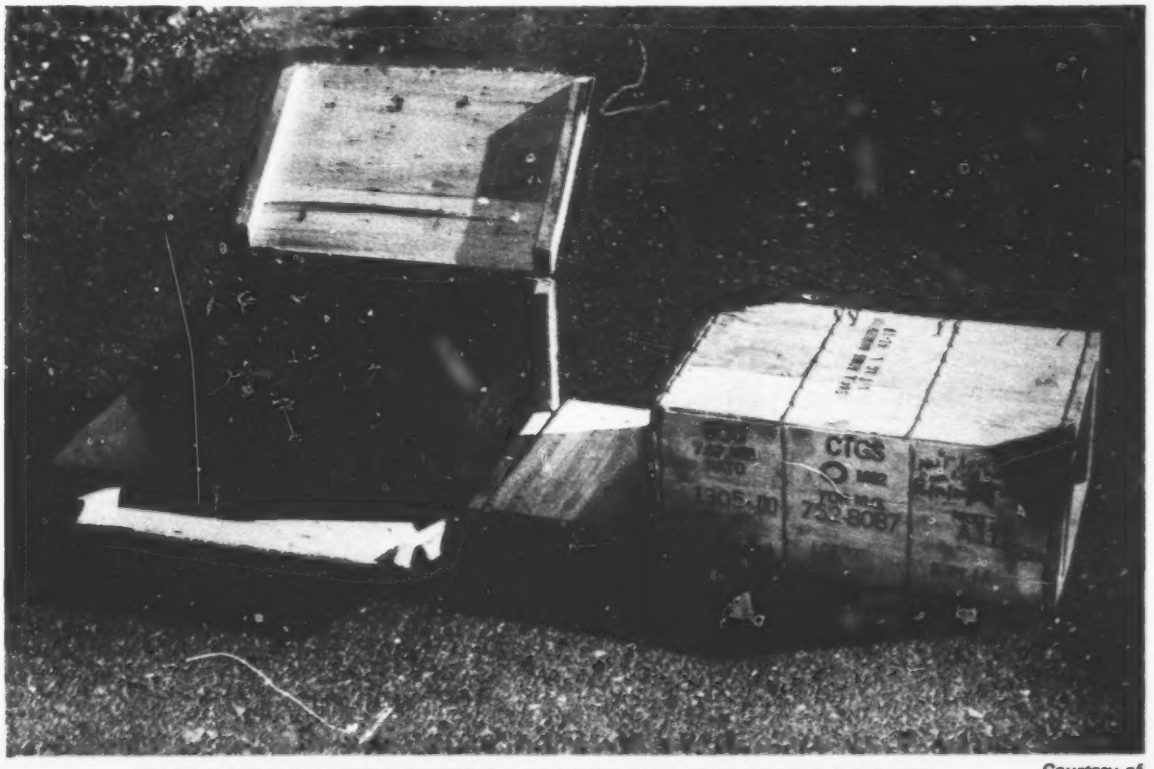
CURRENT PACKAGING PRACTICES

Generally, 5.56-mm. and 7.62-mm. ammunition is packed in cardboard boxes. The boxes, with minor exceptions, are packed in either M2A1 or M19A1 metal containers. The metal containers are then packed in wirebound wood crates--the M2A1 containers, two to a crate; the M19A1, four to a crate. These packaging items, shown on the following page, protect the ammunition during storage and transportation.



M2A1 METAL CONTAINERS AND WIREBOUND WOOD CRATES

Courtesy of
U.S. Air Force



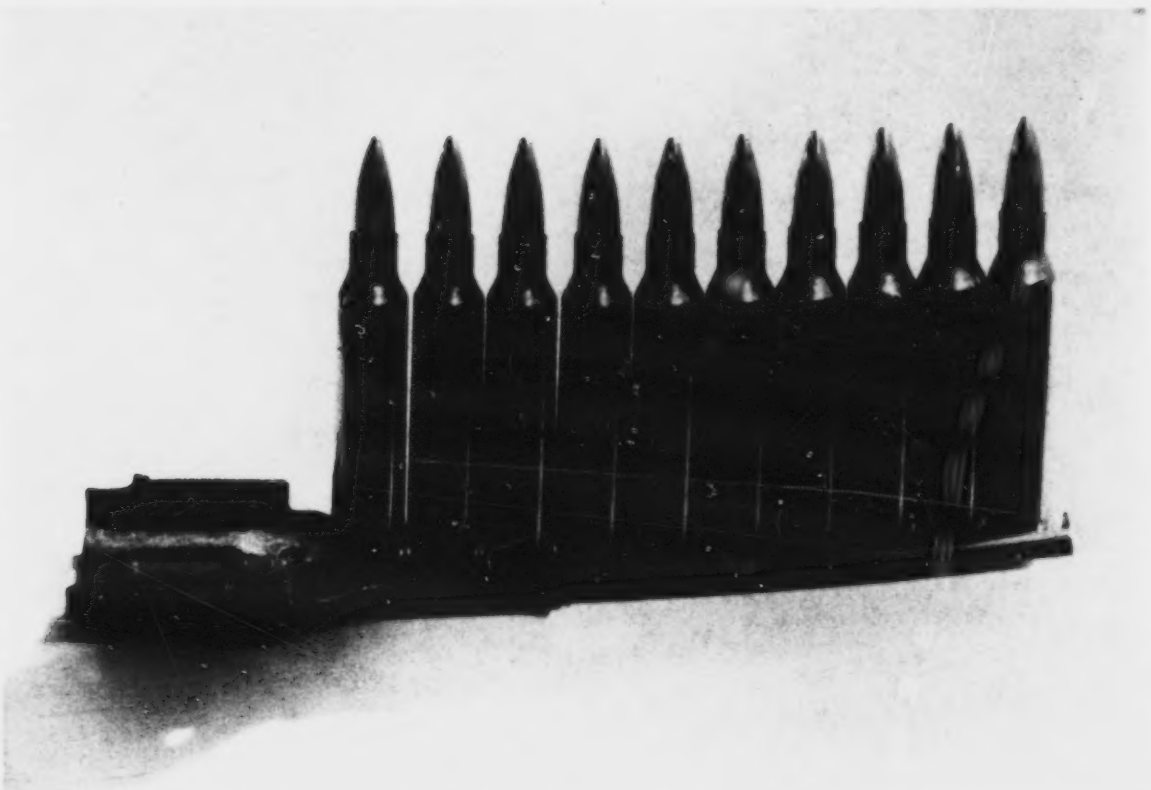
M19A1 METAL CONTAINERS AND WIREBOUND WOOD CRATES

Courtesy of
U.S. Air Force

The 5.56-mm. ball ammunition and seven of the eleven 7.62-mm. types are packed in cloth bandoliers. The 5.56 size is packed 140 rounds to a bandolier. Six of the eleven 7.62 size are packed 100 rounds to a bandolier, and a seventh is packed 60 rounds to a bandolier. The bandolier, shown below, is an olive-drab cotton cloth ammunition container with a carrying strap and pockets designed to carry clipped or magazine cartridges. Several bandoliers can be draped over the shoulder leaving an individual's hands free for other tasks.

BANDOLIERS—5.6-mm. BALL AND 7.62-mm. LINKED. Courtesy of U.S. Air Force

Each 10 rounds of the 5.56-mm. ball ammunition is packed in a metal stripper clip. The rounds from these clips are loaded into the weapon magazine with a metal magazine feeder that is packed with each bandolier. Stripper clips and magazine feeders, shown below, speed the loading process by allowing an individual to load 10 rounds into a weapon magazine at one time. Without them, rounds have to be loaded one at a time.



MAGAZINE FEEDER AND 10 ROUND STRIPPER CLIP USED WITH 5.56-mm. BALL AMMUNITION

Courtesy of U.S. Air Force

PACKAGING MATERIAL COSTS

The following table shows the principal packaging costs for the planned 1982-86 procurement of 5.56-mm. and 7.62-mm. training ammunition, based on fiscal year 1982 prices.

Packaging item	Quantity required	FY 1982 unit cost	Total cost
M2A1 metal container	1,459,379	$ 5.25	$ 7,661,740
M2A1 wirebound wood crate	729,690	3.20	2,335,008
M19A1 metal container	3,571,685	3.73	13,322,385
M19A1 wirebound wood crate	892,922	3.20	2,857,350
Bandolier (5.56--140 rounds)	3,967,015	0.84	3,332,293
Bandolier (7.62--100 rounds)	7,143,370	0.74	5,286,094
Metal stripper clip (5.56)	55,538,200	0.08	4,443,056
Loading adaptor (5.56)	3,967,015	0.03	119,010
			$39,356,936

REASONS FOR CURRENT PACKAGING PRACTICES

Except for 5.56-mm. blank ammunition, which is packed without bandoliers, stripper clips, and magazine feeders, DOD packages 5.56-mm. and 7.62-mm. training ammunition the same way it packages ammunition stockpiled for use in combat. According to an ARRCOM official, this is done primarily because (1) users want training ammunition packed in combat configuration and (2) placing all ammunition in a combat pack gives DOD the flexibility to divert training ammunition to combat use. Our analysis showed that these reasons do not justify the use of the combat pack for small arms training ammunition.

As discussed in chapter 3, DOD can reduce the packaging costs for small arms training ammunition, without significantly modifying the combat configuration, by simply using a less expensive packaging material. We recognize that users need to be familiar with the configuration of the combat pack and, while the users indicated the need for such familiarization, they stated that this does not mean that they must use the

combat pack with all training ammunition. For example, as discussed in chapter 3, some users said that they would prefer a training pack for 5.56-mm. ball ammunition that did not include the bandoliers, stripper clips, and magazine feeders that are part of the standard combat pack.

Clearly, the need to divert training ammunition to combat use does not apply to blank ammunition. Further, the flexibility to divert live training ammunition to combat use would not necessarily be lost if DOD used a more economical pack for this ammunition. According to the joint service packaging regulation, activities that ship and store ammunition must assure that materiels and resources are available to accomplish the required packaging of rotational stocks to support mobilization/contingency operations. This packaging, should it become necessary, could be accomplished while units are using the ammunition that is stockpiled to sustain combat operations for a specified period of time.

Other points should be noted about DOD's need to divert training ammunition to combat use. A major conflict is the occurrence likely to necessitate such an action. In the event of a major conflict, there will be a continuing need for training ammunition in the continental United States. These training requirements could be satisfied with the existing stock of training ammunition while new production increased and shifted to the use of the combat pack.

Finally, while the use of less expensive containers and exclusion of items, such as stripper clips, may make live ammunition less convenient to use in combat, it does not make it unusable.

An ARRCOM official cited one additional factor that might prevent the use of a training pack to satisfy training ammunition requirements. According to this official, DOD tries to use the nonstandard ammunition in its inventory to satisfy training requirements. When this is done, newly procured ammunition replaces the nonstandard ammunition and, in essence, becomes part of the services' war reserve stock. To the extent this is done, we agree that it may be appropriate to procure ammunition in the standard combat pack. If so, this requirement is something that can be anticipated and it should be managed. However, on the basis of our work at the Army's 7th Infantry Division at Fort Ord, California, and at the 1st Marine Division at Camp Pendleton, California, it appears that the services are not using much nonstandard stock to satisfy their 5.56-mm. and 7.62-mm. training ammunition requirements.

CHAPTER 3

OPPORTUNITIES TO REDUCE PACKAGING COSTS

DOD can reduce the unit cost of small arms ammunition and save about $33 million in material costs by packaging training ammunition in less expensive containers and by including only those items needed for training. Specifically, DOD should use, where possible, training packs that are

--without bandoliers,

--without stripper clips and loading adaptors (in the case of 5.56-mm. ball ammunition),

--packed in fiberboard rather than metal containers, and

--packed in fiberboard outer packs rather than wire-bound wood crates.

LITTLE NEED FOR BANDOLIERS WITH TRAINING AMMUNITION

Although bandoliers are needed in combat, they are not needed and are seldom used in training. Most bandoliers are discarded as trash or turned over to Defense Property Disposal Offices as scrap. None is recycled for use in subsequent ammunition production runs. On the basis of fiscal year 1982 costs, we estimate that DOD could save about $8.6 million between fiscal years 1982 and 1986 if it bought live 5.56-mm. and 7.62-mm. training ammunition and blank 7.62-mm. ammunition without bandoliers. Blank 5.56-mm. ammunition is already being packed without bandoliers.

According to users at Camp Pendleton and Fort Ord, the environment and conditions that make the bandolier necessary in combat generally are not present in training situations. In most training, ammunition is either fired from a stationary position or the amount that must be carried is too small to warrant use of a bandolier.

Users said that bandoliers for 5.56-mm. ammunition are rarely, if ever, needed for training. They said it is inappropriate for training, such as qualification and familiarization firing. Users also said that in situations where the bandolier could be used, such as extended live fire training exercises, they are seldom given enough ammunition to warrant the use of a bandolier.

Some users also said they did not need bandoliers for part of the training they do with 7.62-mm. ammunition. For example:

--Members of the Army's 7th Infantry Division said they usually do not need bandoliers with live 7.62-mm. ammunition because, generally, they fire the ammunition from a stationary position. They do sometimes use bandoliers when they train with 7.62-mm. blank ammunition.

--The training officer of the Marine Corps' infantry training school at Camp Pendelton said the school trains with the assault pouch that is part of the basic equipment for the M60 machine gun, and therefore, does not need the bandoliers that come in the combat pack.

--During fiscal year 1981, the 1st Marine Division will not need bandoliers for approximately 179,200 rounds of 7.62-mm. ammunition that will be fired from machine guns mounted in tanks.

Rather than including bandoliers with training ammunition, we believe it would be more economical, and would not be detrimental to training, for DOD to either (1) make bandoliers organizational equipment that can be issued and returned with individual weapons or (2) control their issue and return at the installation ammunition supply point.

The Marine infantry training schools's use of the assault pouch demonstrates the feasibility of the first alternative, and feasibility of the second alternative has also been demonstrated. At Fort Ord, California, for example, the 7th Infantry Division returns used bandoliers to the ammunition storage point. In January 1981, the storage point, which periodically turns the bandoliers over to the Defense Property Disposal Office as scrap, had on hand over 4,000 used 7.62-mm. bandoliers and over 7,000 used 5.56-mm. bandoliers. According to the division training officer, training would not be adversely affected if units had to draw ammunition and bandoliers separately. These alternatives probably could be implemented at no added cost by saving bandoliers from present stocks as the ammunition is used. At worst, bandoliers could be ordered separately through the supply system.

NEED FOR STRIPPER CLIPS AND MAGAZINE FEEDERS IS QUESTIONABLE

The ability to load ammunition rapidly is critical during combat, but this need either does not exist or, at best, is questionable during training. DOD can save approximately $0.6 million by eliminating metal stripper clips and magazine feeders from the 5.56-mm. ball ammunition it plans to purchase between fiscal years 1982 and 1986. Other types of 5.56-mm. ammunition do not come with these items.

The Marine Corps' and the Air Force's annual qualification firings are examples of peacetime training that do not require

the use of stripper clips. Typically, less than 10 rounds are fired during each order of firing. Because of this, rounds must be taken out of the 10-round stripper clip and inserted into the magazine one round at a time.

On the other hand, Army officials at Ford Ord generally believed that stripper clips and magazine feeders were useful. Marine Corps officials at Camp Pendelton also stated that the items were useful for training situations other than qualification firing. In instances where the magazine feeders and stripper clips are used, we believe the services should weigh the benefit derived in relation to the cost of these items.

Although DOD seldom uses 5.56-mm. ball ammunition, it has already established a training pack (stock number 1305-00-965-0775) that eliminates not only the stripper clips and magazine feeders but also eliminates bandoliers. This pack contains fifty 20-round cardboard cartons in a fiberboard box. It is listed in the Army supply catalog but is not included in either the Marine Corps' ammunition allocation regulation or the Air Force's technical order on small arms ammunition.

A Marine Corps official at Camp Pendleton said the 5.56-mm. training pack would be ideal for qualification firing. On the basis of projected fiscal year 1982 costs and current training levels, we found that use of this training pack for annual qualification firing would save over $1.6 million at Camp Pendleton during fiscal years 1982 through 1986. If the training pack were used for all of Camp Pendleton's 5.56-mm. ball training ammunition, the total savings during the period would be more than $2.2 million.

METAL CONTAINERS PROVIDE PROTECTION NOT GENERALLY WARRANTED BY TRAINING CONDITIONS

Metal containers provide 5.56-mm. and 7.62-mm. training ammunition with level A packaging that generally is not warranted. According to the military services' joint packaging regulation, level B protection should be used (1) when favorable transportation, storage, and handling conditions are known to exist or (2) on ocean shipments that are intended for immediate use. This is usually the case with 5.56-mm. and 7.62-mm. training ammunition. Level B pack, using fiberboard containers, would save about $16.8 million for the planned fiscal years 1982-86 procurement of this ammunition.

Even when level A packs are required for training ammunition, it may still be possible to use fiberboard containers instead of the M19A1 and M2A1 metal containers. A 1979 ARRADCOM study proposed using fiberboard instead of metal containers for small arms training ammunition for overseas use. The study proposed a level A pack consisting of an inner fiberboard container with barrier bags and an outer wirebound wood crate. For the United States, the study proposed using a level B

pack that substituted fiberboard containers for both the metal containers and the wirebound crate. Although the study showed that substantial savings would accrue, an ARRADCOM official said the proposal was never implemented because the command could not get funds to complete testing.

In some instances, it may be necessary to use metal containers for reasons other than the level of pack. For example, a Navy official said that some small arms training ammunition is periodically taken on board ships and that metal containers are needed because they provide added protection in the event of fire and are less susceptible to rat infestation. Where these requirements exist, the services would still have the option of buying the more expensive combat pack.

DOD achieves little savings from reuse of metal containers

While we believe the fiberboard containers will provide the protection required, and at considerable savings, a case can be made for continuing with metal containers because they can be reused. From a practical standpoint, however, the cans are seldom reused as ammunition containers. Our review disclosed that (1) the Air Force uses very few of the containers returned to ammunition depots, (2) Navy units return few containers for reuse, (3) Marine Corps units turn used containers over to Defense Property Disposal Offices for disposal, and (4) the Army's current inventory of used containers is sufficient to meet anticipated requirements. In fact, because of the large inventory of M2A1 and M19A1 metal containers on hand and the limited future requirement for these items, the Army and the Air Force may be spending money to return containers that later will be sent to the disposal yard.

The Air Force requires its units to return used M2A1 and M19A1 containers to ammunition depots, but rarely reuses them. During fiscal years 1979 and 1980, Air Force units returned 17,588 M2A1 and 9,947 M19A1 containers. But the Air Force reused only 210 M2A1 containers and 52 M19A1 containers during the period. As of December 1980, the Air Force had 33,576 M2A1 containers and 14,754 M19A1 containers at ammunition depots.

The Navy requires its units to return M2A1 containers to the Crane Ammunition Depot Activity in Indiana and M19A1 containers to the Lake City Ammunition Plant in Missouri. However, Navy units did not return any containers during 1980. The Navy's inventory manager stated that he did not know why the containers were not being returned. We did not attempt to determine what the units are doing with the containers.

The Marine Corps directs its units to turn used M2A1 and M19A1 metal containers over to Defense Property Disposal Offices. Some of these containers later are sold to the public, but many are reclaimed by DOD units. For example, during December 1980,

DOD units turned over 654 M2A1 containers to the Camp Pendleton Property Disposal Office and reclaimed 1,639 during the same period. We noted that some of the reclaimed cans were being used as repair parts bins in a motor pool and one was being used as a receptacle for personal items in a marine's wall locker.

Until recently, the Army required its units to return both M2A1 and M19A1 containers to ammunition depots. However, its present wholesale inventory of approximately 1,500,000 used M19A1 containers would last about 85 years if use continued at fiscal years 1979 and 1980 levels. Consequently, units are now being directed to send used M19A1 containers to Defense Property Disposal Offices and only the M2A1 containers are being returned to ammunition depots.

Transportation costs incurred to return unneeded containers

In the past, many M2A1 and M19A1 containers were turned over to Defense Property Disposal Offices after transportation costs were incurred to return the containers to Army depots and to the Lake City Ammunition Plant. For example, during calendar year 1980, Lake City transferred 408,831 M19A1 and M2A1 containers to the disposal yard.

DOD does not accumulate data on the cost of these returns but, on the basis of data obtained at Fort Ord, California, we believe it is sizable. As an example, for a shipment from Fort Ord to Anniston Army Depot, Alabama, the transportation cost for 3,600 M2A1 containers was $2,359, or approximately $0.66 per container. The Fort Ord Transportation Office estimated that a similar shipment to the Lake City Ammunition Plant would cost $1,861, or about $0.52 per container. Even if transportation costs averaged only $0.25 per container, the total transportation costs for the containers recently disposed of at Lake City would be more than $100,000.

The disposal of the 400,000 containers at Lake City and the Army's limited future requirement for used containers is due, in part, to an Army decision to use only new containers for the production of small arms ammunition. The Lake City Ammunition Plant, which manufactures small arms ammunition for DOD, did at one time use the metal containers that were being returned. However, on the basis of a 1976 Lake City estimate that renovation would cost $3.40 per container--$5.80 in fiscal year 1982 dollars--the Army concluded that renovation was no longer cost effective.

FIBERBOARD CONTAINERS COULD REPLACE WIREBOUND WOOD CRATES FOR TRAINING AMMUNITION

According to a value engineering change proposal submitted by the contractor at the Lake City Army Ammunition Plant, more economical wax-impregnated cardboard boxes can accomplish the functions of the wirebound wood crates used with M2A1 metal

containers. If this proposal were to be adopted and expanded to include replacement of the wirebound crates used with M19A1 containers, DOD could save approximately $3.6 million on the 5.56-mm. and 7.62-mm. training ammunition planned for procurement between fiscal years 1982 and 1986. Additional savings could be achieved by making a similar change for .50 caliber training ammunition, since this ammunition is also packed in M2A1 metal containers and wirebound wood crates.

The wirebound wood crates serve two functions. They consolidate the containers--two M2A1 containers to a crate, and four M19A1 containers to a crate. They also prevent the settling of the rubber seal gasket on the container lid and the potential for corrosion of the ammunition when the containers are stacked on top of each other. Clearly, the wax-impregnated cardboard containers would serve the consolidation function. Also, if, as we recommend, training ammunition were packed in fiberboard rather than metal containers, there would be no gasket seal problem.

In addition to these economic benefits, the Lake City proposal stated that the adoption of the wax-impregnated cardboard boxes would prevent the need for the pentachlorophenol (PCP) treatments that are required with the wood crates. PCP, a preservative added to many wood products, is considered a health hazard and creates disposal problems.

Despite these potential benefits, ARRCOM rejected the Lake City proposal because the wax-impregnated boxes do not provide adequate protection for worldwide shipment, handling, and storage under adverse conditions. While this indicates that the boxes may not be suitable for use in a combat pack, there is a strong indication that the boxes are suitable for the small arms training ammunition used in the continental United States. Further, realistic tests have not yet been conducted to determine whether the boxes are suitable for use with small arms training ammunition shipped outside the continental United States.

Use of wax-impregnated cardboard box appears feasible

The wax-impregnated cardboard boxes compared favorably with the wirebound crates in tests conducted at the Army's Lake City Ammunition Plant. For example, a sample of the proposed box, which was subjected to a temperature, humidity, and salt spray environment for 48 hours, exhibited no signs of deterioration or loss of rigidity. Conversely, a sample wirebound crate subjected to the same conditions for the same period of time exhibited heavy rusting of wires and staples, together with severe warpage of wooden members. The wax box also fared well in the following tests.

--Specified markings were affixed to determine if they would adhere to the waxed surface. These markings adhered, as well as markings on the wirebound box.

--The sample box was packed and placed on a pallet and processed through automatic strapping equipment. The box corner was crushed similar to that experienced with the wirebound box but no tearing or material separation occurred.

--Sample containers of both the alternate box and the wirebound crate were prepared and dropped onto a concrete surface from a height of 8 feet. The samples contained M2A1 cans with inert contents that weighed the same as a normal packed can. Both containers were oriented to impact on a corner. In both tests, the integrity of the container was not impaired to the extent that the package contents would have come out, but the M2A1 cans were damaged. The degree of damage to the cans was judged to be equal in both tests.

Despite these results, ARRADCOM officials maintain that the wirebound crates provide greater protection than the wax-impregnated cardboard boxes. For example, one of the problems an official pointed out was that cardboard cannot be treated with a preservative and that the wax-impregnated cardboard box is, therefore, vulnerable to microbiological, insect, and animal attack. This official indicated that serious problems would occur if the ammunition were stored outside for extended periods in an environment like Vietnam. However, while the ARRADCOM officials felt that the wax-impregnated boxes were unsuitable for a combat pack, they indicated that the boxes would very likely be suitable for use with training ammunition used in the continental United States.

Since DOD already has a training pack for 5.56-mm. ball ammunition that consists of a fiberboard box with no outer pack (see p. 13), we believe that ARRADCOM should test the feasibility of substituting fiberboard containers for both the inner metal containers and the outer wirebound crates. Further, we believe that ARRADCOM should subject the wax-impregnated boxes to reasonable tests to determine their suitability for small arms training ammunition used not only in the continental United States but also overseas. We believe it is unreasonable to test whether small arms training ammunition can survive extended periods of outside storage in an environment like Vietnam.

We also discussed the current packaging practices and alternatives with officials at DOD and Army headquarters. They agreed with the concept of using fiberboard containers instead of metal containers and wirebound wooden crates and of excluding those items (such as bandoliers and clips) not needed for training. They stated, however, that the use of such a training pack may not always be appropriate; that is, some training must be with the use of combat packs. They concluded, therefore, that the savings would probably be less than our estimate shown in appendix II. DOD and Army headquarters officials stated that they would have to study the various training applications more thoroughly to determine the extent of savings.

As noted on page 9, we recognize there will be a continuing need for some combat packs in training. Personnel must be familiar with the configuration of combat packs. Our review indicated, however, that a more economical training pack is appropriate for a vast majority of the 5.56-mm. and 7.62-mm. training requirements. Also, our estimate of potential savings may be understated because it does not include all requirements. In recent years, the Army generally has not procured enough 5.56-mm. and 7.62-mm. ammunition to meet its training requirements. It has been drawing down on the surplus stocks built up during the Vietnam war. As these surpluses are depleted and the Army begins to procure ammunition to meet its training requirements, the potential savings shown in appendix II are likely to increase significantly. For example, if the Army were to purchase enough 5.56-mm. ball ammunition to meet its training requirements during fiscal years 1982 through 1986, the projected savings would increase from $33 million to over $47 million.

PCP problem still unresolved

As previously noted, use of the wax-impregnated boxes instead of wirebound wooden crates is not only economical but would eliminate the health hazard associated with the wood preservative, PCP. This is the main preservative used to protect the Army's wooden products against rot and decay. While PCP has worked well in providing protection, it has come under a cloud of suspicion regarding its possible environmental effects, toxicity to people and, more recently, its possible carcinogenic properties.

Other countries are also concerned about the use of PCP. For example, an October 1980 ARRADCOM message identified the following problems:

--The United Nations' World Health Organization, acting in Korea, has prevented the U.S. Army from disposing of treated ammunition boxes in that country and in Japan. This is forcing the return of thousands of empty boxes to the United States for destruction at the Experimental High Temperature Incinerator in Tooele, Utah.

--The Netherlands prohibits the import of PCP-treated boxes.

--The Egyptians are alarmed at the number of chloracne rashes allegedly occurring among their personnel handling ammunition boxes provided by the U.S. Army.

According to an ARRADCOM official, the Army has a project underway to resolve the PCP problem. The project's three major objectives are to:

--Develop a nontoxic alternative to PCP.

--Identify a safe and effective way to dispose of boxes that have already been treated with PCP.

--Determine what action, if any, is appropriate for those personnel that have had excessive exposure to PCP.

CONCLUSIONS

Although DOD policy requires the use of the most cost-effective packaging, 5.56-mm. and 7.62-mm. training ammunition is bought with packaging material that is not needed and, at best, is used only occasionally for training. Cost of this ammunition could be reduced (1) $4.6 million by not including metal stripper clips and loading adaptors with 5.56-mm. ball ammunition, (2) $8.6 million by packaging it without bandoliers, and (3) $20.4 million by using fiberboard rather than metal and wirebound wood containers. These savings apply to procurements planned during fiscal years 1982 through 1986. The type of packaging which would permit the savings would not adversely affect training.

In the case of the 5.56-mm. ball ammunition, a training pack has already been established which does not contain the stripper clip, magazine feeder, and bandolier. Although this pack has been assigned a stock number, the services have not requisitioned it. Thus, the services could achieve the $4.6 million savings simply by requisitioning the correct stock number.

ARRADCOM officials said the reasons for using the more expensive combat packaging for training ammunition were (1) users want the ammunition they train with in peacetime to be packed like ammunition used for combat, (2) the combat pack gives DOD the flexibility to divert training ammunition to combat use, and (3) the pack allows the use of nonstandard ammunition in combat stocks to meet training requirements. On the basis of our analysis of the conditions and environments under which training ammunition is used, we believe these reasons do not warrant the use of the more expensive combat pack.

The wooden crates used to pack ammunition are treated with PCP, an environmentally hazardous chemical. Using fiberboard for containers rather than wood crates is not only more economical but would eliminate the health hazard associated with chemically treated crates and contribute to the Army's public image by demonstrating the Army's concern for protecting the environment and the public.

RECOMMENDATIONS

We recommend that the Secretary of Defense (1) instruct the Army to use the available 5.56-mm. training pack and (2) require the other services to requisition the training pack stock number.

We also recommend that the Secretary require the Army to have other types of training ammunition packaged in fiberboard containers without bandoliers, stripper clips, and magazine feeders.

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PLANNED PROCUREMENT OF 5.56-MM. AND 7.62-MM. AMMUNITION--FISCAL YEARS 1982-1986 (note a)

5.56-mm. Ammunition

National Stock Number	Type	No. of rounds	Cost	With bandolier	Rounds per bandolier	Container type	Rounds per container
1305-00-914-4719	Live tracer	388,000	$ 200,000	No	-	b/M2A1--Metal	620
1305-00-063-0317	c/Live HPT	258,000	100,000	No	-	Fiberboard box	1,000
1305-00-926-3930	Live ball	d/555,382,000	155,124,000	Yes	140	M2A1--Metal	840
1305-00-936-9253	e/Live 4 to 1	1,195,000	1,000,000	No	-	M2A1--Metal	900
1305-00-182-3217	Blank	780,520,000	108,900,000	No	-	M2A1--Metal	1,140
		1,337,743,000	$265,324,000				

7.62-mm. Ammunition

1305-00-182-3096	Live ball	170,000	$ 50,000	No	-	f/Barrier bag	1,000
1305-00-752-8087	Blank, linked	349,654,000	105,200,000	Yes	100	M19A1--Metal	200
1305-00-990-5594	Blank	2,060,000	500,000	No	-	M2A1--Metal	600
1305-00-914-4675	Live ball	9,180,000	2,700,000	Yes	60	M2A1--Metal	420
1305-00-892-2150	e/Live 4 to 1	240,424,000	107,300,000	Yes	100	M19A1--Metal	200
1305-00-064-2896	Live match	39,766,000	15,500,000	No	-	M2A1--Metal	460
1305-00-892-2330	Live linked ball	81,116,000	34,000,000	Yes	100	M19A1--Metal	200
1305-00-892-2335	Live tracer	34,949,000	16,400,000	Yes	100	M19A1--Metal	200
1305-00-892-4242	Live ball frangible	2,592,000	1,400,000	Yes	100	M19A1--Metal	200
1305-00-889-2169	e/Live 4 to 1	11,602,000	5,000,000	Yes	100	M19A1--Metal	200
1305-00-926-3942	e/Live linked ball	43,506,000	19,200,000	No	-	M548--Metal	1,500
		815,019,000	$307,250,000				

a/We have not included either the 5.56-mm. round for the Squad Automatic Weapon or the 5.56 and 7.62 plastic rounds because they were under development at the time of our review. Their planned procurement costs are approximately $110 million, bringing the total 5.56 and 7.62 cost to over $682 million.

b/The M2A1 and M19A1 containers are packed in wirebound wood crates; the M2A1 two to a crate and the M19A1 four to a crate.

c/High-pressure test.

d/A metal stripper clip is included with each 10 rounds and a loading adaptor with each 140 rounds.

e/Linked in a ratio of 4 ball to 1 tracer. Six million rounds of this quantity are for other than training.

f/Barrier bags are made from aluminum coated with polyethelene.

APPENDIX I

(943087)

POTENTIAL PACKAGING MATERIAL SAVINGS FOR 5.56-MM. AND 7.62-MM. TRAINING AMMUNITION-- FISCAL YEARS 1982-1986 (note a)

Planned Procurement			Proposed Procurement			
Item	Quantity	Cost	Item	Quantity	Cost	Savings
Bandolier	11,110,385	$8,618,387	None	-	$ -	$ 8,618,387
Stripper clip	55,538,200	4,443,056	None	-	-	4,443,056
Loading adaptor	3,967,015	119,010	None	-	-	119,010
M2A1 metal container	1,459,379	7,661,740	Fiberboard container	1,459,379	1,211,285	6,450,455
M19A1 metal container	3,571,665	13,322,385	Fiberboard container	3,571,685	2,964,499	10,357,886
M2A1 wirebound wood crate	729,690	2,335,008	Fiberboard container	729,690	700,502	1,634,506
M19A1 wirebound wood crate	892,922	2,857,350	Fiberboard container	892,922	857,205	2,000,145
Total		$39,356,936			$5,733,491	$33,623,445

a/Based on FY 1982 costs.

APPENDIX II